to indicate a plan which, it seems to me, could be realized and would suggest that it would be possible to work along the following lines: Let a competent American scientific-academic organization take up this matter. The writer can make a formal request on behalf of the Russian Ministry of Agriculture and the Ministry of Education. If the organization in question regards the matter favorably, *i. e.*, it decides that it is expedient and necessary to render those portions of Russia which had been freed from the Bolshevik domination, assistance in the purchase of the books, the instruments, the glassware and other technical equipment for institutions of learning, laboratories and experimental stations, let such an organization enter into negotiation with firms who manufacture and supply the American scientific-academic institutions with technical supplies. The purpose of these negotiations would be the arrangement of easy terms of payment on the purchases which would be necessary. Further negotiations could be carried on by an authorized person who has lists of necessary articles and who might be assisted by the Russian Economic League or some other institution which does purchasing of different commodities for Russia. In this way, it will be something like a loan in goods, such loan being made with the spiritual aid of American scientific and academic circles and with certain concessions on the part of the American firms.

It might be mentioned that such concession should prove a very good business investment, since it would be an excellent foundation for substituting American apparatus and tools for the German articles which are the only ones used in Russian schools so far. This concession would be practically an equivalent of advertising American supplies in Russian educational institutions. The very fact of equipping the Russian institutions of learning with American supplies and having the Russian instructors work with the American-made apparatus and tools clears the way for general adoption of American apparatus and tools in Russia. The habit of using a certain kind of apparatus plays a more important part than may be supposed at first sight and it seems that the time is ripe now to introduce in Russia the habit of using the products of American genius and industry.

I hope sincerely, that the suggestion set forth in this letter may be received sympathetically by the American scientists as well as by the special manufacturing and publishing firms which might be concerned with the carrying out of such a plan. I am ready to enter into all necessary negotiations in respect to this matter and I thank in advance any one who will be kind enough to help me with advice or suggestion concerning my efforts in this direction.

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SCIENTIFIC BOOKS

The Elements of Astronomy. By Charles A. Young. Boston, Ginn & Co. 1919. Pp. x + 508.

Lessons in Astronomy. By Charles A. Young. Boston, Ginn & Co. 1919. Pp. ix + 420.

These are new and revised editions of the most excellent text-books of the late Professor Charles A. Young. From the time this series first appeared some thirty years ago, these books have held high rank among the many that have been written. They show a wide grasp of the fundamentals of astronomy, and these fundamentals are presented to the student in a clear and comprehensive manner.

The author's presentation of the problems involved in the study of the motions of the planets is especially noteworthy. For the mathematician these motions involve the greatest complications and require the most intricate formulas, yet Professor Young places the essential facts before the student in a simple and clear manner. By the aid of a few diagrams and some apt illustrations, the fundamentals of celestial mechanics are explained, and explained so clearly that the youngest student should have no difficulty in understanding the problems and in grasping the essential facts and principles.

The present edition was revised by Miss

Anne S. Young, who retained the greater part of the original text and made such changes only as were necessary to bring it down to date. In general the changes were made with discrimination and the text shows an improvement. Astronomy, however, is not a complete science, and changes and improvements are continually being made. This is especially true of the applications of astronomy to practical matters. In some cases there have been marked improvements in the ideas and methods of thirty years ago, and too rigid an adherence to the original text on the part of Miss Young detracts from the general excellence of the revision. In the discussion of the tides, for example, there has apparently been no change, and the old theory of a world tide, originating in the Pacific and Indian Oceans, has been adhered to. No mention is made of the new theory advanced by the Coast and Geodetic Survey that the tides are purely local phenomena; that the tides of each locality originate in and are confined to that ocean basin of which the particular locality is a part; that the tides of the North Atlantic have no connection with those of the Pacific.

The "Lessons" are for beginners, the "Elements" for the more advanced students. Both books are excellent and no better text-books have yet appeared for these classes of students.

CHARLES LANE POOR

SPECIAL ARTICLES

FURTHER STUDIES IN COLLOID CHEMISTRY AND SOAP

THE following summarizes experimental findings and theoretical deductions which continue studies reported in these pages last year.[1]

I

Our previous work had emphasized not only how from pure soaps and water most typical lyophilic colloid systems may be produced but in what way the chemical constitution of the soaps and variations in concentration, temperature, presence of electrolytes and non-electrolytes, etc., changes the physical properties of these colloid systems. Practically all attempts to explain such changes are to-day electrical in nature. Without denying that electrical phenomena sometimes play a rôle, our newer experiments show that it may be very small or need not function at all.

Typical lyophilic colloid systems may be made of pure soaps in the practical or complete absence of all water. The pure soaps yield such colloid systems with the various absolute alcohols, benzene, toluene, chloroform, carbon tetrachloride and ethyl ether. We feel that our future definitions of lyophilic colloid systems and the understanding of their processes of swelling, gelation, syneresis, reversibility of sol and gel states, hysteresis, etc., must be expressed in the broader terms of mutual solubility. As the hope of getting all phenomena of "solution" reduced to electrical terms seems remote, the hope of getting these fundamental colloid chemical findings reduced to a similar level seems equally remote.

Of the list of effective "solvents," the alcohols have received most study. The solvation capacity of the different soaps (as measured by the maximum amount of alchohol that will be taken up to yield a "dry" or non-syneretic gel at ordinary temperatures) varies in the case of absolute ethyl alcohol for molar equivalents of the sodium soaps of the acetic series of fatty acids from practically zero in the lowermost member to over 27 liters per gram molecule in the case of sodium arachidate. When the solvation capacity of unit weights of any one soap for different alcohols is compared, it is found that this is different not only as mon-, di- or triatomic alcohols are used but different, also, for the different alcohols in any one of the series. For the monatomic alcohols, for example, the solvation capacity increases progressively and smoothly as the position of the alcohol rises in the series. A gram of sodium stearate will just form a gel at room temperature, for example, with 50 c.c. of methyl alcohol, but the same amount of the same soap will form a gel with over 132 c.c. of amyl alcohol. When sodium oleate is the soap employed all the absolute

[1] Martin H. Fischer and Marian O. Hooker, "Ternary Systems and the Behavior of Protoplasm," SCIENCE, 48, 143, 1918.